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Rooting of Trench-Broadcasted Short-Cuttings of a Poplar Clone (*P. x euramericana* (Dode) Guinier c.v. I-45/51)

by

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In minirotation poplar plantations 35 000 or more cuttings per hectare are planted to produce a large biomass from coppice shoots. The establishment of plantations with a large number of individually planted cuttings is expensive and can make the minirotation system uneconomical, despite its good potential for high biomass production.

An alternative would be the use of short, unsorted, mass produced and bulk planted cuttings to provide inexpensive planting stock. Broadcast planting of this stock into trenches could be mechanized, for example, by applying principles and machinery used for planting sugar cane.

To test the use of such stock and planting methods, a minirotation poplar plantation trial was established at the Maple nursery of the Ontario Forest Research Centre (OFRC) in 1978. Indications of the rooting and growth of short cutting stock as affected by storage and broadcasting in trenches were obtained.

Materials and Methods

Regular, one-year-old whips of clone *Populus* x *euramericana* (Dode) Guinier c.v. I-45/51, grown in the stool area of the Maple nursery, were collected on April 15, 1978. Both short and normal length cuttings were produced. The short cuttings were 7.5 cm long and 0.6 - 2.5 cm in diameter.

The cuttings were stored for 3 weeks prior to planting. One-half of the quantity of short cuttings was mixed with slightly moist sphagnum peat moss, packed in plastic bags, and stored at 10-15°C. The other half of the short cuttings and all of the normal length cuttings were packed in plastic bags without moss and stored at 2°C.

The cuttings were planted on May 8, 1978 at the Maple nursery, on a mechanically cultivated site. The soil was deep clay-loam of slightly alkaline reaction. The planting was done in one-row plots, each 5 m long and spaced 1.20 m apart. The following treatments were examined:

1. Short cuttings, previously stored in moss at 10-15°C, were broadcasted into a 10 cm deep by 10 cm wide trench and covered with 5 cm of soil; 140 cuttings were planted to a plot, thus the cuttings overlapped in the trench.

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2. Short cuttings, previously stored without moss at 2°C, were planted the same way and in the same numbers as above.

3. Control: normal length cuttings were planted at 10 cm spacing in the row, 50 cuttings to one plot. Each cutting was inserted vertically into the soil, with the top level with the soil surface and the soil firmed around the cutting.

Complete blocks of each treatment were established in 7 replications. The site was maintained in a regular way, i.e., weeded and irrigated with the rest of the nursery. Fertilizers and herbicides were not applied.

Observations on the rooting and growth were made during the season and the survival and height growth of the cuttings were recorded in October 1978.

Results

Cuttings stored at 10-15°C and packed in moss had developed callouses at both ends and had started root growth from initials along the cuttings prior to planting (Fig. 1). Those stored at 2°C remained dormant.

Observations showed that the normal length cuttings (control) rooted first, best, and grew most vigorously. Root development of short cuttings from both storage methods was highly variable and the plots remained irregularly spaced. Height growth started slowly but increased in vigour by mid-summer. Sometimes pieces of crusted soil were lifted up when shoots from the short cuttings developed, thus possibly causing a drying effect on the cuttings planted in the trench. Cuttings which failed to root did not reveal specific pathogenic causes of mortality. Unusually dry weather conditions in late May and early June may have negatively influenced the rooting and survival of short cuttings.

The results of the year-end tally (Table 1) show that significantly fewer short cuttings than normal length cuttings (99%) survived. Survival of the pre-calloused short cuttings was somewhat better (15%) than the dormant short cuttings (9%) but neither of these forms could be considered satisfactory.

Growth from the short and normal length cuttings was similar. Although pre-calloused short cuttings grew slightly taller than dormant short cuttings, and normal length cuttings grew best, there was no difference statistically.

Unearthed rooted cuttings revealed vigorous and satisfactory root growth and stem development (Fig. 2).

Discussion

The short poplar cuttings, broadcast planted in a trench and as treated here, could develop roots and stems of acceptable size. However, the survival was less than satisfactory. The problems in rooting might have been related to dessication of the cuttings. Protection of cuttings from drying,

TABLE 1 Rooting trial of trench-planted short-cuttings of poplar clone *P.* x *euramericana* I-45/51

Variety	No. planted[a] per plot	Survival % Range	Survival % Average	Stem height (cm) Mean ± standard error
Pre-calloused short cuttings	140	6-21	15.0	93 ± 3.86
Dormant short cuttings	140	3-17	9.0	86 ± 7.62
Dormant normal length cuttings	50	94-100	99.0	127 ± 2.38

[a] Seven randomized plots of each variety were planted.

either by more efficient covering, or by mixing the cuttings with some moisture-holding substratum, or by treating them to protect them from drying, may result in better rooting. Also, the concept of pre-callousing the cuttings which gave positive results in this trial, is worth further exploration.

In a future trial the trench-broadcasting of normal length or even longer cuttings should be explored. Longer cuttings hold more moisture and food reserves and have higher rooting capacity. The mass-production of unsorted cuttings by broadcasting could be mechanized and performed at a higher speed than the planting of individual cuttings. Thus, such a method, if successful, could result in lower cost of establishment of minirotation poplar plantations.

Summary

A planting trial with short (7.5 cm long) cuttings of poplar clone *P.* x *euramericana* cl. I-45/51, stored before planting in two different ways, planted in trenches by broadcasting, and compared with a control of normal length stock, gave the following results:

1. The short cuttings broadcasted into trenches developed roots and grew satisfactory stems.

2. The survival of short cuttings was low and unsatisfactory for practical purposes.

3. Short cuttings pre-calloused in storage give indications of better rooting and growth.

4. Further trials are suggested, with (a) better protection of short cuttings from drying, and (b) the use of unsorted trench-broadcasted longer cuttings.

Figure 1 Pre-calloused short cuttings.

Figure 2 Rooted trench-broadcasted short cuttings.